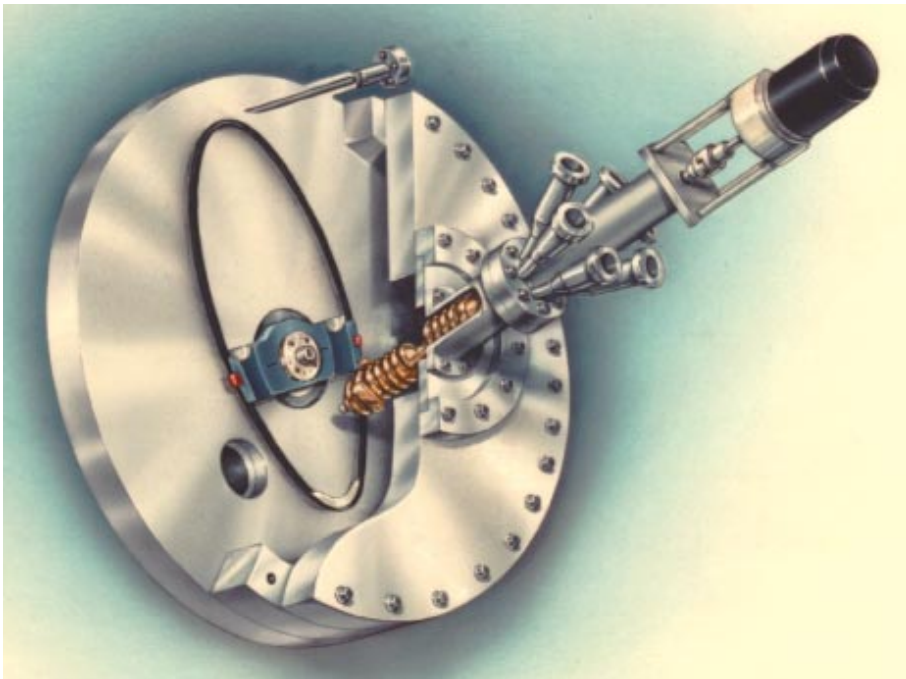


PLASMA FUELING

HIGH-TECH HAILSTONES

In a fusion plasma, the initial fuel of hydrogen isotopes is consumed as the fusion process proceeds. Refueling the plasma requires the placement of additional hydrogenic materials deep within the plasma. The most successful method is to inject cryogenic pellets of hydrogen, deuterium, or tritium, accelerated to speeds of more than a kilometer per second. The techniques developed to form and accelerate these small, fast-moving pellets also supply new ways of dealing with problems in defense, aerospace, environmental remediation, and manufacturing.



A stream of cryogenic carbon dioxide pellets traveling at high speeds can be used to remove surface contamination by ablation. During this ice blasting process, the pellet material evaporates, separating it from the surface contaminant. Surface cleaning with practically no unnecessary waste stream is possible.

Cryogenic pellets are produced by freezing the material of choice (typically carbon dioxide or argon) and then chopping the resulting ice into chunks of the appropriate size. Acceleration techniques developed in the Oak Ridge National Laboratory fusion program include the centrifuge accelerator, left, which can inject up to 100 pellets per second, and the pneumatic accelerator, with pellet speeds up to 3000 meters per second.

